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IS 9997 (1991): Aluminium alloy redraw rods for electrical purposes [MTD 7: Light Metals and their Alloys]

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(पहला पुनरीक्षण)

Indian Standard

ALUMINIUM ALLOY REDRAW RODS — FOR ELECTRICAL PURPOSES — SPECIFICATION

(First Revision)

UDC 669·71 — 422·2 : 621·315·55

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 1991

Price Group 1

Light Metals and Their Alloys Sectional Committee, MTD 7

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Metallurgical Engineering Division Council

This standard was first published in 1981 and now has been revised keeping in view that IS 398 (Part 4) : 1979 'Aluminium conductors for over head transmission purposes: Part 4 Aluminium alloy stranded conductors (aluminium-magnesium-silicon type) (*second revision*)' specifies the use of aluminium alloy wires for standard conductors. In this standard following modifications have been incorporated:

i) Use of aluminium alloy redraw rods of nominal diameters other than 9.5 mm has been permitted;
ii) Wire-bar rolling, has been deleted as method of manufacture;
iii) Chemical composition, chemical analysis and selection of text samples, clauses have been added; and
iv) 'M' (as manufactured) and 'O' (Annealed) tempers have been added and their mechanical properties and electrical resistivity have also been incorporated.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 DECEMBER 1995
TO
IS 9997 : 1991 ALUMINIUM ALLOY REDRAW RODS — FOR ELECTRICAL PURPOSES — SPECIFICATION

(First Revision)

(*Page* 1, *clause* 2, *IS No.* 2658 : 1964) — Substitute '1608 - 1995 Mechanical testing of metals — Tensile testing' *for* '2658-1964 Method for tensile testing of aluminium and aluminium alloy wire'.

(*Page* 1, *clause* 6.1, *Element Si, Under the column 'Percent'*) — Substitute '0.5 - 0.9' *for* '0.50 - 0.90'.

[*Page* 2, *clause* 7.1, *Elongation, percent Min* (on 250 *mm gauge length*)] — Substitute '8, 7, 14' *for* '7, 14, 8' respectively.

(*Page* 2, *clause* 7.2) — Substitute 'IS 1608 : 1995' *for* 'IS 2658 : 1964'.

(MTD 7)

Reprography Unit, BIS, New Delhi, India

Indian Standard

ALUMINIUM ALLOY REDRAW RODS — FOR ELECTRICAL PURPOSES — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies the requirements for aluminium alloy redraw rods for electrical purposes 9.5 mm in nominal diameter. However, this standard can be used for aluminium alloy redraw rods of other diameters also.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard.

IS No	*Title*
504 : 1963	Methods of chemical analysis of aluminium and its alloys (*revised*)
2658 : 1964	Method for tensile testing of aluminium and aluminium alloy wire
3635 : 1962	Methods of test for resistance of metallic electrical resistance material
5047 (Part 1) : 1986	Glossary of terms relating to aluminium and aluminium alloys: Part 1 Unwrought and wrought metals (*second revision*)
5047 (Part 2) : 1979	Glossary of terms relating to aluminium and aluminium alloys: Part 2 Plant and operations, thermal treatment, control and testing finishing
5047 (Part 3) : 1979	Glossary of terms relating to aluminium and aluminium alloys: Part 3 Geometric properties and tolerances, structural and surface defects
10259 : 1982	General condition of delivery and inspection of aluminium and aluminium alloy products

3 TERMINOLOGY

For the purpose of this standard, the definition given in IS 5047 (Part 1) : 1986, IS 5047 (Part 2) : 1979 and IS 5047 (Part 3) : 1979 shall apply.

4 SUPPLY OF MATERIAL

4.1 The general requirements relating to the supply of the material shall be as laid down in IS 10259 : 1982.

4.2 The redraw rods supplied shall be of aluminium-magnesium-silicon alloy (as per the composition specified in **6.1**) in 'M', 'O' or 'W' tempers as agreed between the manufacturer and the purchaser.

4.3 The rods shall be in coil form preferably in one length, however, two lengths may be accepted but for more than two lengths it should be mutually agreed to between the purchaser and the manufacturer/supplier.

5 MANUFACTURE

5.1 The redraw rods shall be manufactured from aluminium-magnesium-silicon alloy and shall have the composition, mechanical properties and electrical resistivity as specified in this standard.

5.2 The rods shall be produced in 9.5 mm nominal diameter, unless otherwise agreed between the manufacture/supplier and the purchaser by any one of the following methods:

a) Continuous casting and rolling, and

b) Extrusion

6 CHEMICAL COMPOSITION

6.1 The redraw rods of aluminium-magnesium-silicon alloy, shall have the following composition

Element	*Percent*
Si	0·50—0·90
Mg	0·6 —0·9
Fe	0·50, *Max*
Cu	0·10, *Max*
Mn	0·03, *Max*
Cr	0·03, *Max*
Zn	0·10, *Max*
B	0·06, *Max*
Other elements (each)	0·03, *Max*
Other elements (total)	0·10, *Max*
Al	Remainder

6.2 The chemical analysis of the material shall be carried out either in accordance with the methods specified in IS 504 : 1963 or by any other established instrumental/chemical method In case of any dispute, the method specified in IS 504 : 1963 shall be used as referee method.

7 MECHANICAL PROPERTIES

7.1 The mechanical properties of rod shall be as given below

	M Temper (for guidance only)	*W Temper*	*O Temper*
Tensile strength, MPa	130, *Min*	160, *Min*	80-140
Elongation, percent, *Min* (on 250 mm gauge length)	7	14	8

7.2 The tensile test shall be conducted in accordance with IS 2658 : 1964

8 ELECTRICAL RESISTIVITY

8.1 Electrical resistivity shall be determined on a representative sample by resistance measurement

8.2 At a temperature of 20°C the electrical resistivity of the sample when tested in accordance with IS 3635 : 1986 shall comply with the values given below:

Condition	*Resistivity* microhm cm at 20°C, *Max*	*Conductivity* (IACS) Percent, *Min*
M	3·19	54
O	3·13	55
W	3·44	50

NOTE — The value of 0·017 241 ohm mm^2/m at 20°C is the International Resistivity of Annealed Copper Equal to 100 percent conductivity This means that a copper wire 1 mm^2 in cross section and one metre length would have a resistance of 0·017 241 ohm

9 DIMENSION AND PERMISSIBLE VARIATIONS

The rod shall be rolled to a nominal diameter of 9·5 mm within permissible variation of ± *0·5 mm, unless otherwise agreed between the manufacturer/supplier and the purchaser.*

10 JOINTS

Joints in the rod, if agreed between the supplier and the purchaser, shall be made by electric butt-welding or by cold pressure welding

11 FINISH AND FREEDOM FROM DEFECTS

11.1 The rod shall be commercially clean.

11.2 The rod shall be sound and free from pipes, laps, cracks, kins, twists, seams and other injurious defects

12 SELECTION OF TEST SAMPLES

12.1 One test sample each for tensile test and resistivity test shall be taken to represent each 2 tonnes or less of rod in the lot Minimum two coils shall be sampled unless the lot consists of only a single coil

12.2 For chemical composition, one test sample shall be taken to represent each furnace load

12.3 Retest

If a sample selected for testing fails to meet the requirements of this specification, two further samples shall be taken from the same lot represented by the sample If either of these samples fails to meet the requirements of this specification, the lot represented by the sample shall be rejected.

13 PACKING

13.1 The material shall be packed in coils

13.2 Coil size and mass shall be agreed to between the supplier and the purchaser at the time of placing the order

13.3 Coil need be wrapped only when specified in the order

13.3.1 The quantity and application of the wrapping material should be adequate to protect rods from damage, incidental to nominal handling and shipment

14 MARKING

14.1 Each coil shall bear a tag showing the indication of the source of manufacture, mass, alloy temper, lot number and date of manufacture of the material and any information required by the purchaser

14.2 The coil shall carry a distinguishing tag, wrapping or the like, to indicate if the coil is in two length and if the material contains any joints.

14.3 Standard Marking

The material may also be marked with the Standard Mark.

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